

THE STATION; ITS HISTORY AND WORK.

[An Outline of Station Work for 25 Years.]

W. H. JORDAN.

ALBANY
J. B. LYON COMPANY, PRINTERS,
1908.

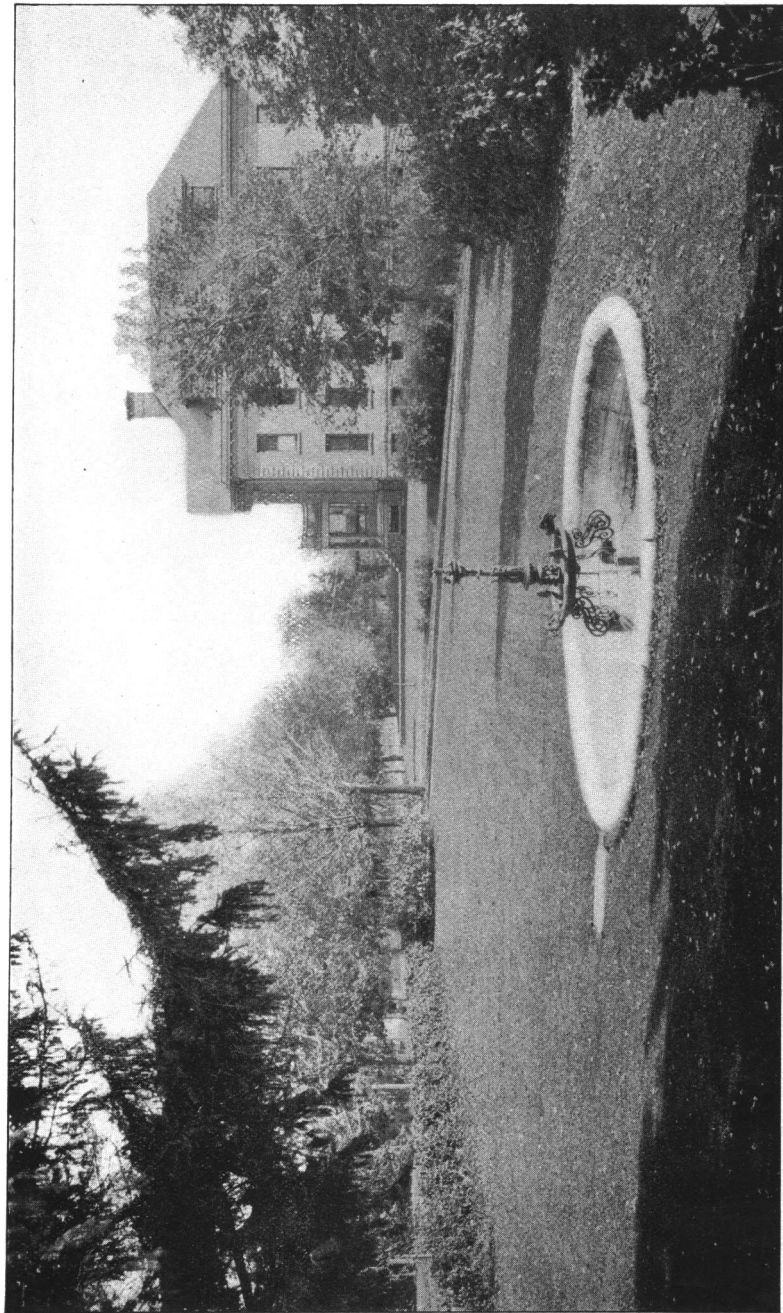


PLATE IV.— BIOLOGICAL AND DAIRY BUILDING.

THE STATION: ITS HISTORY AND WORK.

W. H. JORDAN.

The experiment station movement, which is now worldwide, had its origin in Germany about the middle of the last century. In 1851 a station was established at Möckern, Saxony, under the direction of Dr. Emil Wolff, and within a decade several others were organized on German soil.

Outside of the United States there now exist about 800 stations or similar agencies. Since 1875 sixty such institutions have been organized in the United States, the larger number coming into existence directly following the passage of the Hatch Act in 1887. Since 1888, when their aggregate income was \$710,000, and their total working force 369 persons, the stations of the United States have reached an income of over \$2,000,000, with 950 administrative officers and scientific workers. In 1905 they issued 3,000,000 copies of printed matter.

These stations are a direct outcome of the rise of scientific knowledge and are an organized means for increasing this knowledge and of bringing it into helpful relations to the art of agriculture. At the present time their assistance is invoked in almost every known agricultural problem, and evidently they have become a permanent and essential factor in the guidance of farm practice.

The New York Agricultural Experiment Station was the sixth one to be organized in the United States, probably the fourth to be established through legislative action and direct State aid. It would be difficult to trace out all the individuals and organizations that were active in securing the establishment of this Station and to assign to them the part each played in accomplishing the result. Such an attempt would almost certainly fail of mentioning many persons who actively assisted in this progressive move. Of organizations it may be said that the ones most prominently active in promoting the Station movement in New York were the State Agricultural Society, the State Grange, the Central New York

Farmers' Club, the Elmira Farmers' Club and the Western New York Horticultural Society, to which was added the strong influence of Cornell University.

The first act of the Legislature establishing the Station became a law June 26, 1880 (Chap. 592). This law placed the management of the Station with a Board of Control of ten members to be made up of the Governor of the State, *ex officio*, the executive officers of the State Grange and the several agricultural societies and two members to be elected by the Board after its organization. This Board began its deliberations at once, holding its first meetings at Albany. It was inevitable that a variety of plans should be considered for organizing experiment station work, some of the more prominent of which were the creation of an independent institution with a farm attached, the location at Cornell University as a department of that institution, and the establishment of an office at Albany, the experimental work to be distributed among farmers in various parts of the State. Wisdom prevailed and the latter plan was rejected. Its adoption would have defeated the real objects of an experiment station. The final decision was in favor of an independent institution located on a farm. With this end in view the Board of Control made a public statement of its purpose and asked for proposals from different localities as to available farms and the conditions under which one could be acquired by the State. It is the remembrance of a member of this first Board that over one hundred proposals were received. A committee, consisting of Messrs. Barry, McCann and Woodward, finally narrowed the choice of a location down to three places, viz.: Geneva, Palmyra and Spencerport, and so reported to the full Board. Geneva was selected as the site of the new institution. Plans had so far been agreed upon by February, 1881. In the meantime the Comptroller had rendered a decision declaring defective the law establishing the Station on the ground that the Board created by the law was self-constituted and self-perpetuating, and as the State had no control over it public money could not be constitutionally used to pay its expenses. While the Attorney-General submitted a contrary opinion further legislation was thus rendered advisable. A bill was prepared creating a Board of Trustees, consisting of the Governor, *ex-officio*, and nine members appointed by him. This became a law August 15, 1881. (Chap. 702). The title to the farm at Geneva passed to the State early in 1882.

Dr. E. Lewis Sturtevant of South Framingham, Mass., was elected director of the Station. He took possession of the Station property and entered upon his duties on March 1, 1882.

DEVELOPMENT OF THE STATION.

The Station property, when the State came into possession of it, consisted of a farm of 130 acres on which was located a brick mansion house and the usual set of farm buildings.

For quite a period of time the second and third stories of the mansion house served as the home of the Director, the first story and basement being converted into offices and laboratories. The farm buildings after more or less reconstruction were utilized in part for such experiments with animals as were carried on. The institution has developed gradually in building equipment, the more important additions having been made at the dates given below.

- 1888 Large cattle barn.
- 1891-2 Chemical laboratory.
- 1893 Forcing houses.
- 1895 Cold storage house for fruit.
- 1895-6 Triple house erected on north side of North street.
- 1897 New forcing house and new poultry house.
- 1897-8 Dairy and biological building.
- 1900-1 Director's house.
- 1901-2 Original mansion house converted into administration building.
- 1902 On May 7th fire destroyed five buildings,—three barns and two poultry houses.
- 1902-3 New cattle barn.
- 1903-4 New horse barn.
- 1903-4 Fire protection system.
- 1904-5 Storage building.
- 1907 Appropriations are now available for the erection of five dwelling houses.

These buildings provide fairly satisfactory facilities for the work of the Station, including well-equipped chemical, botanical, bacteriological, entomological and horticultural laboratories, experimental dairy rooms, library, and convenient administrative and department offices. The cattle barn, forcing houses and poultry houses are also well adapted to experimental work.

Outside of the increase of buildings, the main growth of material equipment has been the development of the fruit plantations, from a small apple orchard to a collection at times of over 5,000 varieties of large and small fruits, including apples, apricots, nectarines, peaches, pears, plums, and all the varieties of small fruits of importance in the Northern States.

The Station staff has increased in number from five in 1888 to between thirty and forty at the present time. Until 1897 there were no clearly recognized departments in the Station outside the chemical and horticultural. In that year a policy of enlargement was inaugurated and a closer subdivision of the staff was made, so that now there exist departments of animal husbandry, bacteriology, botany, chemistry, entomology and horticulture. The prominent features of the animal husbandry division are the dairy and poultry work.

Such an enlargement of the Station has been made possible only through greatly increased financial support. The initial sum provided by the State annually for the maintenance of the institution was \$20,000 and is now \$86,500. Besides this sum the institution receives one-tenth of the Federal appropriations under the Hatch and Adams acts, amounting this year to \$2,200.

POLICY AND WORK OF THE STATION.

When experiment stations were first established in the United States various widely divergent views prevailed as to the work these institutions should do and the relations they should sustain to agricultural practice. In the discussions preceding legislation many things were said that created false impressions in the public mind as to the kind of service these new institutions would render. Comparatively few persons conceived of an experiment station as a means of acquiring scientific knowledge fundamental to farm practice. It was more generally thought that they were to be model farms where farmers would see the best known, and the most profitable, management. Recently a member of the first Board of Control of the New York Station was asked "What was it expected that the Station would do?" and he replied, "I think the general expectation was that we were to run a farm at a profit to show how to make it a paying institution." Gradually, however, the public has forsaken the idea of a model farm and has come to understand that the function of an experiment station is to solve the individual problems of the farm and not to dictate business management.

The initial policy of the Station at Geneva was largely determined, of course, by the point of view of its first director. It was fortunate that Dr. Sturtevant saw clearly the need of well-established fundamental facts and principles as a basis of farm practice. He was keenly alive also to the possible errors of prevailing methods of experimental work of the so-called practical character and gave much attention to determining their source and extent and the means of minimizing them. He held that much preliminary work was needed in order to learn how to experiment and how to interpret results and the first six annual reports of the Station contain many data on the errors of certain classes of experiments, especially those of the field and stable. As to the broad function of the Station, Dr. Sturtevant asserted that its object "is to discover, verify and disseminate." By this he meant that the Station should establish new principles and facts of importance to agriculture; discover and verify the uses of both old and new knowledge in agricultural practice and by some means acquaint the agricultural people with the new information. He believed the great want of agriculture to be the establishment of principles that shall serve as a guide to reasoning. This is a sound and well-balanced policy. Rightly interpreted it leaves no room for an all-absorbing effort of popular instruction into which so many station men have unfortunately been thrown.

Dr. Sturtevant held positive views in other directions. He believed that the organization of the Station was faulty in that it did not place the sole management and responsibility upon the director. He held that the function of the Board should be limited to the control of the financial interests and the appointment or displacement of the Director, giving the Director power to appoint his own employees and carry out his own ideas untrammelled. He declared that unity and continuity of direction could not be secured in any other way. If in any case the management is not successful, the remedy is to displace the Director and appoint another. It is quite safe to say that this view now prevails quite generally in practice, if not in theory, in the management of experiment stations.

Dr. Sturtevant also advised that the work of the Station should not be confined to the Station grounds. He practically advocated placing the Station on a Smithsonian footing with a central band of workers engaged in independent research and locating distinct practical problems with individuals selected according to their location and fitness. These views probably did not meet with popular

approval, but had their essential spirit more fully prevailed in the organization and management of experiment stations, there would have been a greater advance in knowledge than has been attained.

During the years immediately following the administration of Dr. Sturtevant the Station entered upon a period of material development. Within the space of seven years, under the lead of Dr. Collier, a large cattle barn, the chemical laboratory and the forcing houses were erected and provision was made for three staff houses.

Early in his administration Dr. Collier called attention to the importance of the stock interests of the State, especially the dairy industry, and advised that the Station should do more in this direction. As one result of this recommendation, breed tests were instituted, in the pursuance of which important data were collected concerning several breeds of dairy cattle. He also advised establishing a department of fertilizer control at the Station and through this movement a law was passed placing the inspection of fertilizers in the control of the Station and at the same time, and largely because of the law, funds were provided for the erection of a chemical laboratory.

Other recommendations of Dr. Collier were the organization of at least ten branch stations in the State, to be under the immediate supervision of local boards of control, the central control to be at Geneva, and the establishment at the Station of a department of agricultural implements. Neither of these propositions materialized and it is fortunate that the first one did not, for a much more efficient and economical method is now in vogue, viz.: The studying of problems in any place where opportunity offers. The only justification for establishing branch stations is that they offer a better opportunity for studying a variety of conditions than does a single station. But when it is remembered that each one of the sixty counties of the State has within itself a great variety of agricultural production under equally variable conditions, the futility of attempting to multiply branch stations to meet all local needs is made evident. The contention of the first Director of the Station that a central research effort should be maintained, combined with a study of practical application of knowledge in various parts of the State as opportunity offers, is the prevailing policy in some States, especially the older ones, and is one that experience appears to justify.

It was during the administration of Dr. Collier that the existence of the Station was jeopardized. In his annual message for 1893, Governor Flower suggested the discontinuance of the Station by concentrating all such efforts at Cornell University. Later he visited the institution and evidently changed his point of view, for in his message of the following year he advised that the Station be well sustained.

The directorship of the Station changed hands again about the middle of 1895, Dr. L. L. Van Slyke acting as director until July 1, 1896, at which time the writer assumed the office, which position he still holds. During the past twelve years the Station has continued to grow steadily in its equipment and scope of work practically along the lines which previously occupied its attention. The more notable results during this period have been a closer specialization of the work through additions to the staff and its more definite division into departments, the growth in laboratory facilities for special work, particularly in bacteriology, botany, entomology, and dairying, and a material increase of experimental work in various parts of the State in studying the use of fertilizers, the testing of spraying and other methods for the control of fungus diseases and injurious insects, the comparison of methods of orchard management, observations on alfalfa culture and other lines of work. We have rented land, leased orchards and made other business arrangements with farmers in order to carry on these outside observations satisfactorily. During the past three or four years from thirty to forty experiments have been in operation each year in co-operation with nearly as many farmers in different parts of the State. In addition to this, sixty or more farmers have received soil for inoculating new alfalfa, and volunteer observations on potato spraying have been reported to us by a large number of potato growers. This general plan has much to commend it and continued experience strengthens the conclusion that it is the most efficient way possible for testing Station conclusions and at the same time impressing the results upon the attention of farmers.

METHODS OF EXPERIMENTATION.

The first director of the Station held, and with much reason, that the first work of our experiment stations should be to establish safe methods of experimentation. At the time the New York Station was established, a great deal of field experimentation was in operation by the plat system and many feeding experiments were being

carried on with different classes of animals. From the results so obtained conclusions were being drawn as to methods of practice. Dr. Sturtevant rendered useful service in showing by actual field trials the possibilities of very large errors from the assumption that plats of equal size would produce equal quantities of grain or other products. He conducted tests with sorghum, corn and potatoes where the plats were given as nearly uniform treatment as it was possible to give. During several years' work he found differences between duplicate plats of corn ranging from 14.3 bushels per acre to 39.2 bushels. With potatoes the differences ranged from 12 bushels per acre to 107 bushels. Dr. Sturtevant reached the sane conclusion that field experiments conducted on such a basis were utterly unreliable as a means of testing either methods of treatment and cultivation or the relative efficiency of fertilizers. The decrease in the number of field experiments conducted in the manner tested is an indication that the unreliability of the methods previously followed is generally recognized. To secure safe conclusions from plat experiments is a much more difficult matter than was at first supposed. Such preliminary work was needed and it served as a corrective of unsafe conclusions.

THE WORK ACCOMPLISHED BY THE STATION.

In the development of its work it cannot be said that the Station has given proportionate attention to each one of the agricultural industries, large or small. General farm crops, vegetable gardening, floriculture and bee keeping have either held a minor place in the efforts of the Station staff or have received very little or practically no attention in the way of investigation. The phases of agriculture which have received most prominent attention are dairying and fruit culture. There are at least two reasons for this limitation of **Station work**: One is that dairying and fruit raising are our leading agricultural industries, and the ones that offer the most attractive and the most available opportunities for helpful service. The second reason is that as it is not possible to carry on very many lines of inquiry at the same time, it has seemed advisable to select those problems of the largest importance. Those who have not engaged in scientific investigation do not appreciate how time-consuming and energy-consuming a single piece of research is. For these reasons many problems have remained untouched, some of them important, and doubtless it has often been felt that the limits of the Station work have been too narrow.

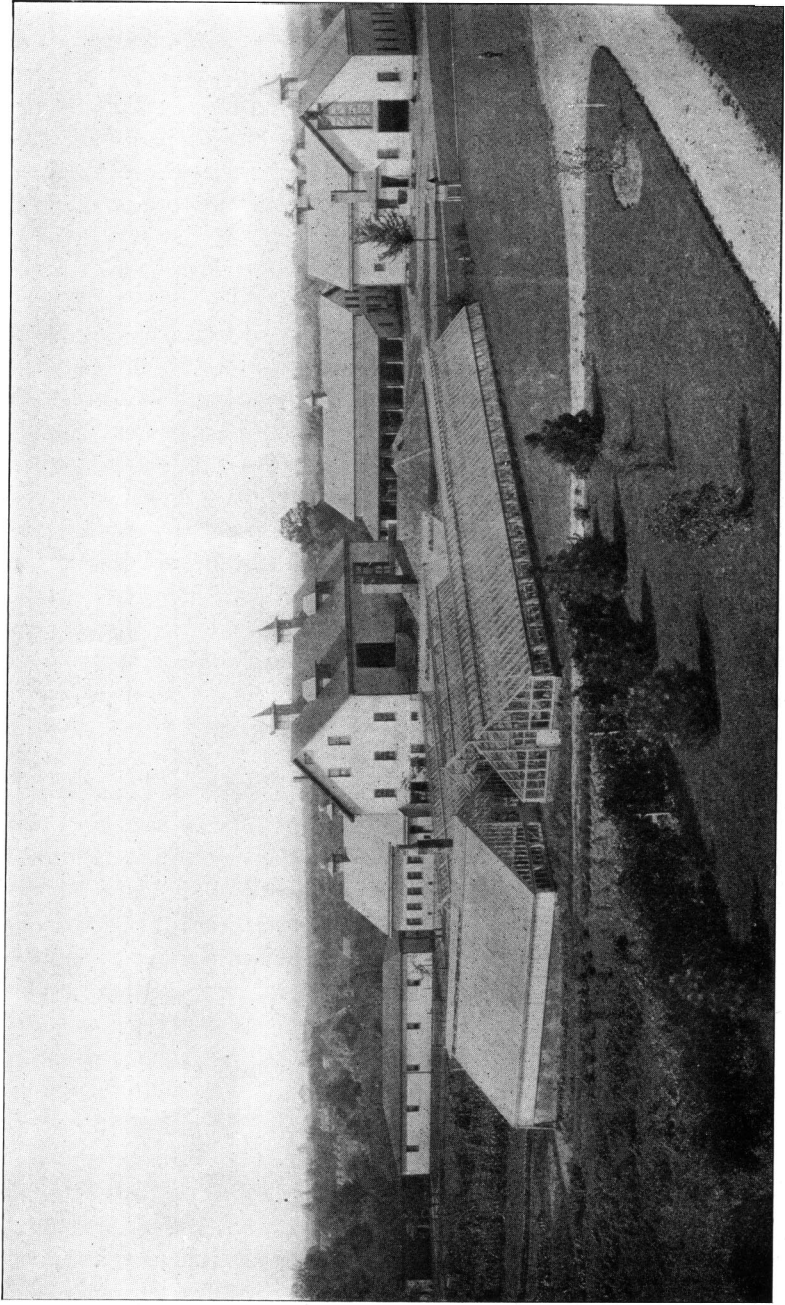


PLATE V.—FORCING HOUSES AND BARN.

In the pages which follow an attempt is made to summarize in a somewhat popular way the principal results that have been reached at the Station. In this immediate connection I shall only present a numerical and topical outline of the problems that have been studied. The subjects that have been considered in the way of inquiry are approximately 300, to say nothing of many minor questions to which more or less attention has been given. The studies of these various problems have occupied from a few weeks to several years.

A careful examination of the data secured indicates that something has been added to the existing knowledge of about 200 subjects. In about 100 cases the Station conclusions are believed to have been applicable to the betterment of farm practice. In many instances, of course, the data gained have been inconclusive. Some studies were begun ten or more years ago and are not yet completed.

The following is a partial list of the investigations made:

The promotion of the growth of alfalfa in the State of New York by illustrative work at the Experiment Station and by aiding proper inoculation of soil throughout the State; tests of relative value on same and different soils of varieties of field crops, new or little known species of grasses and new forage crops; demonstration of value of proper selection, curing (including kiln-drying), storage and testing of seed corn; proof that tip kernels of the ear make good seed; demonstration of value of deep preparation of soil for corn and of harmfulness of root pruning and weed growth in caring for crop; proof that large seed oats are most profitable, that productive hills of potatoes give best seed, that large-sized seed pieces are better than small, that large applications of fertilizers are not usually profitable on potatoes or onions, and that barnyard manure is not harmful to sugar production in sugar beets; a study of the canning of peas, resulting in a safe and efficient method; determination of the cause of fire-blight in apples, pears and quinces; test of bordeaux mixture and other fungicides for controlling apple scab; study of the bordeaux injury to fruit and foliage of apples and pears; effect of spraying apple trees while in bloom; cause and control of apple canker; control of bean anthracnose; demonstration of the black-rot germ on cabbage seed; spraying experiments for control of diseases of nursery stock; experiments on the control of cucumber downy mildew; experiments for controlling gooseberry mildew; tests of chemicals for treatment of oats to prevent smut; test of sulphur-lime treatment to prevent

onion smut; determinations of sprayings necessary to control pear scab and best time for making them; the profits of spraying potatoes (five years' work already done); control of raspberry anthracnose; cause and control of raspberry cane blight; the exclusion of dodder seed from alfalfa seed; study of at least twelve garden insects and introduction of effective insecticides in place of proprietary remedies often unreliable and injurious; first Station to publish results on use of paris green for codling moth; extensive work on the control of San José scale; demonstrations in control of pistol case-bearer, the tent caterpillars, the New York plum lecanium, the grape flea-beetle, the spring canker worm, and a great variety of other insects; twenty-five years' work on varieties of apples and other fruits; the preparation and publication of "The Apples of New York," the nearly complete preparation of "The Grapes of New York;" extensive tests of the profits from thinning apples; conclusive work on self-fertile and self-sterile grapes, and demonstration of harmonious varieties; the use of cover crops for orchards; the vitality of seed as affected by various factors, such as age, size, drying, the portion of the plant on which seed is borne, maturity, and specific gravity; winter vetch proved to be valuable as fall-sown cover-crop; demonstration of excessive and wasteful use of fertilizers on potatoes; extended aid to sugar beet growing in the State by studies of the crop in various portions of the State; availability of different phosphates for two different species of plants; influence of the amount of plant food on the composition and growth of plants; effect of the fineness of fertilizing material on availability; relation of the composition of the soil to plant growth; effect of plant growth upon the soluble materials of the soil; relation of the amount of fertilizer to the soluble matter of the soil; digestion experiments with new materials; tests of new cattle foods; increase in growth of maize up to maturity; relative effect of rations with wide and narrow nutritive ratios; effect of the ration upon the composition of the animal's carcass; the food source of milk fat; the metabolism of phosphorus compounds and their physiological influence; extensive observations on the growing of alfalfa as a forage crop and on the use of corn for silage purposes; numerous experiments with poultry, including such problems as general food requirements of hens of different type; the necessary nutritive ratio for laying hens; the supply of egg shell material; the particular value and effect of Indian corn and other feeding stuffs; influence of food on molt; the use of skimmed

milk; the influence of salt; the production of capons; causes of feather eating; breeding experiments continued for many years; the relative profits of the larger and smaller breeds; the relative efficiency of ground and whole grain for laying hens and chicks; the importance and economy of using animal food; the importance of mineral matter and the value of grit; and the adaptability of certain concentrated by-products for poultry feeding; testing the value of several forage plants as a food for growing pigs; relative value of wet and dry grain for pigs; relative efficiency of corn meal and corn on the cob for pigs; relative cost of growing pigs of different breeds; feeding experiments with pigs of different crosses; investigations of syrup and sugarmaking, including adaptability of sorghums and sugar beets; chemical studies on milk and its products; composition of normal milk used at cheese factories; composition of milk in relation to yield of cheese; composition of milk in relation to the composition of cheese; composition of milk in relation to the quality of cheese; composition of whey and cheese; methods of paying for milk for cheese-making; conditions affecting weight lost by cheese in curing; commercial experiments in curing cheese at different temperatures; conditions affecting chemical changes in cheese-ripening; action of acids and bases on casein and paracasein; first chemical changes in cheese; enzymes in relation to cheese-making and cheese-ripening; comparative study of different breeds of dairy cows; comparative profits derived from selling milk, butter, cream and cheese; proteids of butter in relation to mottled butter; composition of commercial soaps in relation to spraying; chemistry of home-made cider vinegar; and methods of analysis.

INSPECTION WORK.

In 1891 fertilizer inspection was inaugurated in New York, the work being placed wholly in the hands of the Experiment Station. In 1899 a similar inspection was established for commercial feeding stuffs. The inspection of these two commodities, including the collection of samples and analysis of samples, and action in the case of violations of the law, remained wholly with the Experiment Station until 1904, when new legislation was enacted transferring the general administration of the law to the State Department of Agriculture, reserving to the Experiment Station the duty of making the analyses of such samples of fertilizers and feeding stuffs as were transmitted to the Director of the Station by the Commissioner of Agriculture. Since the inspection of these two classes of com-

mercial articles was established in New York, the Station has analyzed 11,826 samples of commercial fertilizers and 2,369 samples of concentrated commercial feeding stuffs. Twenty-five bulletins have been published giving the results of the inspection of fertilizers and nine bulletins reporting the inspection of feeding stuffs. This work is provided for by special funds and is not allowed to interfere with the fundamental purpose of the Station, because it is assigned to a special force of men who are not in any way related to investigational functions. **The value of this inspection is unquestioned.**

Manufacturers have been obliged to make definite statements concerning the composition of each brand of goods that has been placed upon the market. Consumers may now know pretty definitely what they are purchasing under a given brand name. Moreover, through the reports of the inspection the public has become well acquainted with the character of the goods that are offered in the markets. At the same time much has been learned, especially with feeding stuffs, concerning the nature of the materials from which many of the brands have been compounded, and farmers have been made acquainted with the inferior materials that are used for purposes of adulteration. Probably no experiment station effort has been of more direct financial benefit than has the inspection of these two classes of commodities.

STATION OFFICERS.

On pages III to VI there is given a complete list of the persons who have been, or are now, connected with the Station either in an administrative or a scientific capacity, with the terms of service. The following table gives a classified statement of the number of persons occupying various positions of administration or scientific service:

Trustees	50
Treasurers	2
Secretary and Treasurer	1
Directors	3
Directors, acting	1
Agriculturists	1
Animal Industry, assistant	3
Bacteriologists	1
Bacteriologists, assistant	4
Botanists	2

Botanists, assistant	4
Chemists	3
Chemists, associate	2
Chemists, assistant	32
Dairy Expert	1
Editor and Librarian	1
Entomologists	3
Entomologists, assistant	4
Horticulturists	3
Horticulturists, acting	1
Horticulturists, assistant	10
Student assistants	5
Stenographers	5
Clerks	2

138

It appears that in all 138 positions have been filled. In some cases more than one position has been held by the same person. The number of individuals so far connected with the Station work is found to be only 126. Of these 59 have served the institution in an administrative capacity and 67 have been associated with its scientific work.

In looking over the record of former members of the scientific staff it is gratifying to note that approximately 25 are worthily filling positions of greater or less prominence in other institutions. Many of the young men who received their initial training in experiment station work at this Station have attained prominence in the scientific world and have accomplished results of great usefulness.